Understanding Pragmatic Language Development: Comparing Adults and Children

Liana Martínez

Department of Spanish and Portuguese

Advisors: Dr. John Grinstead & Dr. Allison Bean Ellawadi

Language Acquisition Lab
The Ohio State University

THE OHIO STATE UNIVERSITY

Background

Conversational implicatures are a dimension of unsaid meaning that are produced in specific pragmatic contexts (Grice 1975). The quantifiers of a language like English, according to Horn (1972), fall on a scale of strength {none, few, some, many, most, all} on which the use of a weaker quantifier implicates that a stronger quantifier would not have been felicitous.

The existential quantifier *some* has the logical meaning of "some, and possibly all" in sentence 1, but has the pragmatically enriched "some, but not all" meaning in sentence 2, as illustrated by their continuations:

1. If some students pass my test, you owe me lunch.
   .....and all of them did, so you owe me lunch.

2. Last week, some students passed my test
   .....and others did not.

Chierchia (2001) argues that some in 1 cannot have an implicature because it occurs in the antecedent of a conditional, i.e. the "if" clause of a conditional sentence, which is a syntactic context known to cancel conversational implicatures.

Child English speakers seem to be aware of this distinction, as it has been shown that they can both generate and cancel scalar implicatures (Guasti et al 2005). However, the role of intonation in children's ability to compute and cancel pragmatic implicatures is relatively unstudied.

There are phonetic variants of *some* tested here:

3. Phonetic Variants of *some*

a. *Sm* students are coming to my office
   - no pitch accent, no vowel

b. *Some* students are coming to my office
   - Vowel, but no pitch accent

c. *SOME* students are coming to my office
   - Vowel and L+H* pitch accent – contrastive stress

Prosody Acquisition

- Cruttenden (1985), Wells et al (2004) argue that children are late to develop adult-like interpretations of prosody.
- In contrast, Snow (2006) has speculated that children's knowledge of prosody undergoes a qualitative leap when two-word syntax begins to be used – around 2;0.
- Chen and Fikkert (2007), Frota and Vigário (2008) and Prieto et al (2008) argue that lexical development, and not syntax, is relevant to intonational development.

Specific Questions

1. At what point do children come to have adult-like knowledge of the pragmatic-prosody interaction in their use of phonetic variants of the quantifier *some*?
1. Is there a relationship between morphosyntactic development and pitch accent perception?

Experiment 1 (with Emily Selio)

Methods

Participants: 23 English-speaking children (Age Range = 71 months to 107 months, Mean Age= 84.3 months) participated in this study. 10 children were outside 1 standard deviation from the mean for their age on a standardized language test (CELF-4) and 6 of the children did not pass the fillers within the experiment. Others were excluded for having received speech therapy in the past.

Materials: Children were assessed on standardized language skill tests including the CELF-4, (language test) KBIT-2 (nonverbal IQ test), and Truth Value Judgment Task (Crain & McKee 1986) on the E-Prime software computer design with headphones. The E-Prime software recorded yes-no responses using a button box, which also recorded their reaction time. Previous recorded trials done by Jenny Thorward (2009) used video-recorded trials using a lion puppet, panda puppet, a barn, a fence, and 8 sets of plastic barnyard animals.

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Experiment 1 (contd)

Question

According to earlier work (Thorward 2009, Grinstead et al 2010), the presence/absence of a pitch accent appears to be important to implicature cancelation, as de-accented *some* allowed more implicature cancellation than pitch-accented some in both adults and children.

Do older children appear more adult-like in using both pitch and duration to interpret phonetic variants of *some*?

Procedures

This experiment used a Truth Value Judgment Task (Crain & McKee 1986) in a between-subjects design. Children were asked to listen to "Sam" the lion puppet and to judge the correctness of Sam's description of the scenario. There were four target sentences, two training sentences, and two control sentences. Children were required to pass both control sentences to be included in the study.

Stimuli

There were eight sentences with animals jumping over a fence. Participants were assigned to a condition in which they heard only 1 of the 3 phonetic variants of *some*, as in Thorward (2009).

Four target sentences were declaratives presented after a video in which either 3 or 4 of 4 animals jumped over a fence:

Implicature Generating Context
- Sm/some/SOME cats jumped over the fence.

The other two of the four target sentences appeared in an implicature-canceling syntactic context, the antecedent of a conditional sentence:

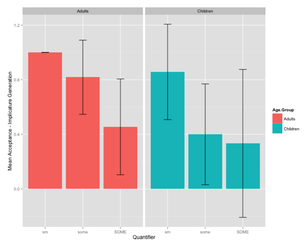
Implicature Canceling Context
- If sm/some/SOME cats jump over the fence, you owe me a quarter.

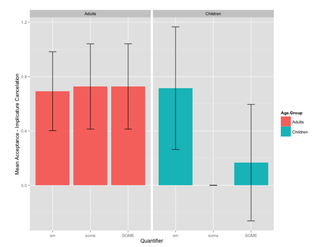
There were also two control sentences using the words "all" and "none" with either 0 of 4 or 3 of 4 animals jumping over a fence, preceded by two training sentences with 4 of 4 or 3 of 4 animals jumping over the fence, also with the words "all" or "none."

The three variants of *some* tested were significantly different from one another by pitch and variation.
- *SOME* has a higher pitch than *some* (p < .001) and *SOME* has a higher pitch than *sm* (p=.001).
- *SOME* has a longer vowel than *some* (p < .001)
- *SOME* is a longer word than *sm* (p = 0033)

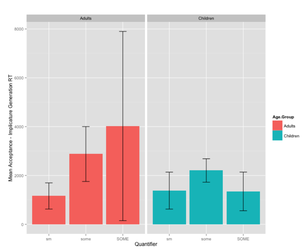
Results

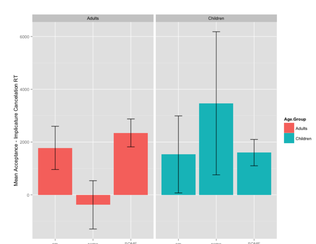
- Children are not different from adults in their judgments of *sm* and *SOME* in implicature generating contexts (p < .05), but are different with respect to *some* (chi-square (1) = 3.884, p = .049).
- These results are similar to those of Thorward (2009), who argued that children paid attention to duration, in that long words (*some* and *SOME*) generated implicatures, while the short variant (*sm*) does not.
- Also similar to Thorward's preschool children, our 5-8 year-olds generate more implicatures in downward entailing contexts with *some* (chi-square (1) = 11.748, p = .001) and *SOME* (chi-square (1) = 4.898, p = .027) than adults do, but not with *sm* (p < .05).





- With respect to reaction time for adults, there were no significant differences in Implicature Generation among the three variants of *some*, in my data, but adults were significantly faster in Implicature Cancelation with *some* than they were with *sm* or *SOME* (F(2)=15.739, p < .001, also p <.001 for post-hoc *sm* vs. *some* and *sm* vs. *SOME*.)
- For the children, in the Implicature Generation condition, *some* took significantly longer than either *sm* (p = .035) or *SOME* (p = .036). There were no significant differences in the Implicature Cancelation condition, yet the data appeared to trend in the same direction.





Discussion

- Accuracy results suggest that the roughly 7 year-old children in our sample, like the 5 year-old children in Thorward's (2009) sample, appear to depend on duration as a phonetic cue, instead of pitch and duration, to signal pragmatic implicatures.
- Also as in Thorward's preschool sample, our school-aged children generated more implicatures in the implicature canceling condition than adults did, except with *sm*. This ability to look adult-like with *sm* in implicature canceling contexts is probably what underlies their apparently adult-like behavior in previous work (e.g. Chierchia 2001).
- An intriguing result is the difference in reaction time between adults and children with some in the Implicature Canceling condition. Since *some* is the most frequent variant of "some" (Thorward 2009), it is interesting that the children in our sample are so much slower than adults.

Experiment 2

Methods

Participants: Identical to Experiment 1.

Materials: Specific data was taken from the standardized CELF-4 test in order to analyze and identify any inflection-implicature correlation.

Procedures

Similar to Experiment 1. Children were given standardized tests, specifically the CELF-4 in order to test specific language functions. The KBIT-2 and E-Prime video were not used in this experiment.

Stimuli

16 sentences from the CELF-4 were chosen as representative of children's expressive morphosyntactic knowledge. They include measures of noun plural marking, verb tense, genitive marking on nouns and relative clauses.

Proportion correct of the morphosyntactic items was compared to both accuracy and reaction time on the Truth Value Judgment Task measures to determine whether the relationship predicted by Snow (2006) obtains.

Questions

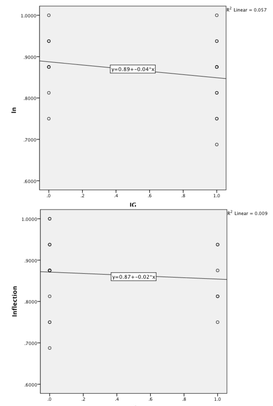
Is there a correlation between inflection and implicature generation for children between the ages 5 to 8 years old, as Snow (2006) might predict?

Results

- Inflection-accuracy relationship is not significant. Point-biserial correlation to measure continuous (inflection)-categorical (TVJT answers) was non-significant (p > .05).

Descriptive Statistics

	Mean	Std. Deviation	N
Inflection	.866477	.0825006	22
IG	.55	.510	22
IC	.27	.456	22



Correlations

		Inflection	IG	IC
Inflection	Pearson Correlation	1	-.238	-.094
	Sig. (2-tailed)		.286	.679
	N	22	22	22
IG	Pearson Correlation	-.238	1	.559**
	Sig. (2-tailed)	.286		.007
	N	22	22	22
IC	Pearson Correlation	-.094	.559**	1
	Sig. (2-tailed)	.679	.007	
	N	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

- Pearson Product Moment Correlation between inflection and reaction time in our small sample seemed promising, but not significant (r= -.318, p = .15). Results seem to show that children do better at inflection, the faster their reaction time is with *some*.

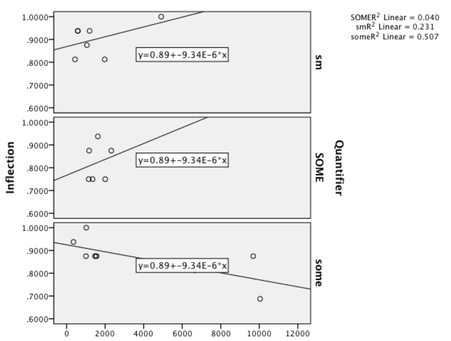
Descriptive Statistics

	Mean	Std. Deviation	N
Inflection	.866477	.0825006	22
IG	.55	.510	22
IC	.27	.456	22
IGrt	1715.77	839.062	22
ICrt	2436.59	2804.208	22

Correlations

		Inflection	IG	IC	IGrt	ICrt
Inflection	Pearson Correlation	1	-.238	-.094	-.059	-.318
	Sig. (2-tailed)		.286	.679	.794	.150
	N	22	22	22	22	22
IG	Pearson Correlation	-.238	1	.559**	.109	.187
	Sig. (2-tailed)	.286		.007	.628	.404
	N	22	22	22	22	22
IC	Pearson Correlation	-.094	.559**	1	-.358	-.307
	Sig. (2-tailed)	.679	.007		.102	.164
	N	22	22	22	22	22
IGrt	Pearson Correlation	-.059	.109	-.358	1	.447*
	Sig. (2-tailed)	.794	.628	.102		.037
	N	22	22	22	22	22
ICrt	Pearson Correlation	-.318	.187	-.307	.447*	1
	Sig. (2-tailed)	.150	.404	.164	.037	
	N	22	22	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).



Discussion

- In our small sample, there is no relationship between accuracy and morphosyntax (inflection), as Snow (2006) might predict.
- The possible connection between morphosyntax and reaction time is interesting, particularly in implicature canceling syntactic contexts, given children's non-adult-like tendency to generate implicatures in them.